Attachment 8

Fairfax County Comprehensive Transportation Plan Update

Analysis of Transportation System

April 10, 2006

Prepared for:

Fairfax County Department of Transportation
12055 Government Center Parkway, Suite 1034
Fairfax, VA 22035

Prepared by:

CAMBRIDGE SYSTEMATICS

Cambridge Systematics, Inc.
4800 Hampden Lane Avenue, Suite 800
Bethesda, MD 20815

Fairfax County Comprehensive Transportation Plan Update

Analysis of Transportation System

prepared for

Fairfax County Department of Transportation

prepared by

Cambridge Systematics, Inc.
4800 Hampden Lane, Suite 800
Bethesda, Maryland 20814

with

William G. Allen, Jr.
Transportation Consultant
HNTB Corporation

date

April 10, 2006

Table of Contents

List of Tables

List of Figures

Executive Summary

This report documents Fairfax County's evaluation of the transportation impacts of alternative land use and transportation concepts as part of the County's periodic update to its long-range transportation plan. The land use element of the County Comprehensive Plan is under review in a parallel effort to the transportation plan update.

Five of the most important land use and transportation system concepts, each of which represents a distinct "scenario" for Fairfax County residents and workers, are described and presented in the report. The purpose of this analysis is to provide technical guidance for the update of the transportation element of the Comprehensive Plan.

The results of the final round of scenario tests are shown below. Each scenario is evaluated in terms of its impact on the following:

- **Travel demand.** Number of transit and multipassenger auto trips;
- **Congestion.** Lane miles of travel that operate in congested conditions during the evening peak period (three hours) of travel;
- **Accessibility.** Number of residents in the region that are within a 45-minute drive of Fairfax County's defined employment centers;
- **Delay.** A measure of the additional time required to make a trip due to congestion, in comparison to the travel time under free-flow conditions; and
- **Travel Time.** A measure of average time on a typical weekday between a single origin and destination pair.

Several measures not discussed explicitly in this report were considered as well, such as auto and transit screenline volumes. Some of these more detailed analyses are included as a technical appendix to this report.

The three alternative land use concepts tested were:

1. **MWCOG Cooperative Land Use Forecasts Round 7.0.** The regional projections of population and employment growth are regularly updated by a cooperative forecasting process administered by the Metropolitan Washington Council of Governments (MWCOG). The most recently adopted cooperative forecasts, Round 7.0, assume a concentration of employment growth in defined employment centers with good transportation access, and increasing options for travel by transit and high-occupancy vehicle (HOV). Higher levels of multifamily housing are concentrated in the centers as well. Development in environmentally-sensitive areas is avoided, protecting watersheds and open space. A good deal of residential growth continues in the suburbanized areas. Compared to the Round 6.4 forecasts, relatively more population and household growth occurs within the core areas of the region, reducing in-commuting from the outer areas of the region.

2. **MWCOG Cooperative Land Use Forecasts Round 7.0 w/BRAC.** Round 7.0 with BRAC is identical to the Round 7.0 forecast described above, with the exception that it incorporates the recommendations of the Defense Base Realignment and Closure Commission[1], and assumes that military employment disperses within the region. In the Northern Virginia area, one consequence of these recommendations is that military employment will decrease in Arlington County and increase at Fort Belvoir in Fairfax County, creating a net increase of about 9,000 U.S. Department of Defense- (DoD) related jobs in the Northern Virginia area.
3. **Focused Household Scenario.** This scenario pivots off of the MWCOG Round 7.0 forecasts and assumes that an even higher level of future population and household growth will occur in clusters of concentrated development, with increased opportunities for walking, taking transit, and using HOV lanes to meet travel needs.

The three alternative transportation concepts tested were:

1. **Constrained Long-Range Plan (CLRP).** The CLRP is an expression of the Washington region's fiscally-constrained, long-range transportation funding priorities. Transportation improvements listed in the CLRP, as adopted by the Transportation Planning Board (TPB) of the MWCOG, have demonstrated their effectiveness in regional transportation analyses and fall within revenue projections from all Federal, state, and local sources for long-term transportation expenditures over a 20- to 30-year time horizon. Key CLRP projects in Fairfax County/Northern Virginia include: 1) HOV lanes on I-95; 2) the extension of the Metrorail system through Tysons Corner to Dulles International Airport, and on into eastern Loudoun County; and 3) high-occupancy toll (HOT) lanes on the Capital Beltway. The CLRP also includes all of those projects in the list of transportation system improvements which are funded for initiation within the next six years, known as the fiscally-constrained Transportation Improvement Program (TIP). In this analysis, the CLRP serves as a baseline for comparison to other plan scenarios. A list of the most important projects in the CLRP is included in Appendix A.
2. **Existing County Plan with Express Bus Service.** The existing county transportation plan focuses on investments to improve internal county travel, and includes proposed improvements to Route 28, U.S. Route 50, the Fairfax County Parkway, and Route 123. The County plan includes all CLRP improvements. To these proposed improvements is added an extensive network of express bus service operating along the arterial highways between all major defined activity centers in the County, which provide transit access to centers of activity in neighboring jurisdictions.

[1] The Defense Base Realignment and Closure (BRAC) Commission was established by the United States Congress to study and review the DoD's list of proposed military based closures and realignments.

3. **Enhanced Transit and HOV (ETHOV).** The enhanced transit and HOV scenario represents a significant expansion in regional transit and HOV investments, and builds towards a network of public transportation facilities to serve both work and non-work travel between major development centers in the County. The ETHOV includes all CLRP improvements and includes other potential investments such as: 1) an extension of the Metrorail system to Fort Belvoir; 2) a transitway (bus or rail) along Route 28 that provides a transfer point to the Metrorail extension through Tysons Corner to Loudoun County; 3) a transitway which parallels the Capital Beltway from Springfield to Tysons Corner; 4) a transitway along Columbia Pike from the Pentagon/Pentagon City area to Bailey's Crossroads that would serve medium- to high-density development; 5) an extension of the Virginia Railway Express (VRE) commuter rail line from the City of Manassas to the Town of Haymarket/U.S. Route 15 area of western Prince William County, and 6) an express transit service operating on the Fairfax County Parkway and the Franconia-Springfield Parkway during peak periods of travel.

After analyzing the performance of various combinations of these alternative land use concepts and transportation networks, a new recommended hybrid concept emerged. The recommended hybrid alternative comprises the year 2030 Cooperative Round 7.0 Land Use concept, plus the impacts of the BRAC recommendations and the most effective elements of the transportation networks tested.

Relative to the current County transportation plan, the Recommended Hybrid Scenario:

- Reduces reliance on single-occupant auto use,
- Generates more transit ridership,
- Improves mobility and accessibility for County residents and workers, and
- Maintains congestion levels closer to year 2000 conditions than do the other scenarios.

Lastly, the hybrid scenario more explicitly responds to the Policy Plan's revised transportation objectives and policies, most specifically in the areas of:

- Multimodalism,
- Transportation Demand Management (TDM), and
- Improved integration of land use and transportation.

These scenario tests have led to a set of recommended transportation improvement projects that are proposed for inclusion in the Fairfax County Transportation Plan (TransPlan) update. These recommended improvement projects are discussed briefly below and in more detail in the main body of the report.

1. *Fourth Metrorail Station in Tysons Corner Area.* For consistency with the recommendations of the Federal Environmental Impact Statement and the ongoing engineering studies for the Metrorail extension, this plan update includes the identification of four transit stations. These stations are identified as

Tysons East, Tysons Central/Route 123, Tysons Central/Route 7, and Tysons West, respectively.

2. *Metrorail Orange Line Extension to Centreville Area*. This plan update recommends an extension of the Metrorail Orange line from its current terminus at the Vienna/Fairfax-GMU Station west to the Centreville area, consistent with the Alternatives Analysis/Draft Environmental Impact Statement under development.

3. *Columbia Pike LRT/BRT to Baileys Crossroads/Skyline*. An "Enhanced Public Transportation Corridor" designation is proposed for Columbia Pike, from Bailey's Crossroads to Tysons Corner.

4. *Improved Transit Service to Fort Belvoir*. "Enhanced Public Transportation Corridor" designations are proposed for the following corridors in this plan update:

   - U.S. Route 1, from the Huntington Metrorail Station to Fort Belvoir; and

   - The I-95 corridor, along the Metrorail Blue Line from the Franconia/ Springfield Transportation Center to Fort Belvoir.

5. *Express Bus/BRT Improvements in Selected Corridors*. Corridors proposed for an "Enhanced Public Transportation" designation in this plan update are:

   - U.S. Route 50 from the Fairfax/Loudoun County line east to the City of Fairfax and continuing to the east to the City of Falls Church; and

   - VA Route 236 from U.S. Route 50 to the I-395 interchange near the Fairfax County/City of Alexandria line.

6. *HOT/HOV Lanes on the Capital Beltway*. A private consortium, under terms set by the Commonwealth's Public Private Transportation Act (PPTA), will undertake the detailed planning, design, construction, and operation of four HOT lanes, two lanes in each direction, along the Capital Beltway corridor between the Springfield Interchange (I-95/I-395/I-495) and the vicinity of the American Legion Bridge. This plan update acknowledges this project.

7. *HOV on the Fairfax County Parkway/Franconia-Springfield Parkway from Route 7 to Springfield*. This plan update recommends an increase to six lanes from Baron Cameron Avenue to Route 7, to accommodate HOV lanes. The HOV operation would use the planned third lane in each direction along the Parkway mainline, with HOV operations provided in both directions during the AM and PM peak periods in a manner similar to the peak period HOV operations along the DTR corridor.

8. *HOV on Route 28 from County Line to Route 7*. This plan update proposes an HOV operation that would use the planned fourth lane in each direction along Route 28, with HOV operations provided in both directions during the AM and

PM peak periods in a manner similar to the peak period HOV operations along the Dulles Toll Road (DTR) corridor.

9. *New Interchange on Fairfax County Parkway at Shirley Gate/Pope's Head Road*.

10. *Substitute Overpass for Full Interchange at Little River Turnpike in Annandale Commercial Business Center*. This plan update recommends the construction of an overpass to carry north-south traffic in the Annandale Road/Backlick Road corridor over Little River Turnpike. The connections to and from this grade-separated overpass link would be provided by improved local circulation street linkages to the northern and southern ends of the overpass structure.

11. *Laurel Hill Roads*. This plan update revises the recommendation for Lorton Road through the area from six lanes to four, Furnace Road south of Lorton Road from four lanes to two, and Silverbrook Road between Route 123 (Ox Road) and Hooes Road from two lanes to four. Several adjustments to planned collector roadways on the Laurel Hill property are also recommended.

1.0 Overview of the Plan Update Process

The development of the updated TransPlan involved both a technical and public and agency involvement process. The principal elements of the technical process are described below.

1.1 TECHNICAL PROCESS

The three primary objectives associated with the technical analysis element of the TransPlan update process are:

1. To provide an up-to-date picture of the performance of the County's transportation system for the present (2000 to 2005) and future years (2030);
2. To assess the implications of potential transportation network improvements and land use development scenarios on the performance of the county transportation system in the year 2030 through the use of an enhanced travel demand forecasting process; and
3. To review and update transportation policies, plan maps, and other plan elements to guide future investment decisions.

The principal tool used in the conduct of this technical process was an adaptation of the MWCOG regional travel demand forecasting model[2]. The Transportation Planning Board (TPB) of the MWCOG is the Federally-designated metropolitan planning organization (MPO) for the region. In its role as the coordinating body for many of the region's transportation planning activities, the TPB has been responsible for the development and application of a regional travel demand forecasting tool since the 1960s. Through an agreement with its local member agencies, MWCOG coordinates the allocation of Federal, state, and local funds for transportation projects of regional significance. MWCOG also conducts Federally-mandated air quality conformity analysis for the region.

The MWCOG regional travel demand model employs a state-of-the-practice four-step modeling process involving trip generation, trip distribution, mode choice, and traffic assignment modules. The model is continuously updated with the participation of the member agencies, which include representatives of the three states (Maryland, Virginia, and the District of Columbia); all of the local governments such as Fairfax County, and transit service providers such as the Washington Metropolitan Area Transit Authority (WMATA) and VRE.

[2] See http://www.mwcog.org/transportation/activities/models/ for more information.

The transportation model used for the TransPlan update is identical to the MWCOG model in most respects, except that it provides a much higher level of detail in the Fairfax County portion of the region. With respect to geographic area of coverage, the Northern Virginia portion of the MWCOG travel demand model currently includes all of Arlington, Fairfax, Loudoun, and Prince William Counties; the Cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park; and portions of the immediately adjacent counties in Virginia and West Virginia.

The entire regional model, whose highway system is shown in Figure 1.2, includes a total of 2,191 traffic analysis zones (TAZs). The Fairfax County portion of the model presently includes a total of 356 TAZs. TAZs are relatively small geographic areas of residential and commercial development that are treated as a single unit for analysis purposes. These aggregations are a necessary compromise that permits the forecasting process to be completed in a reasonable amount of time. The benefit of creating a larger number of smaller TAZs for Fairfax County within the existing regional model structure is that the additional zones allow for the definition of additional entry and exit points on the roadway system, and facilitates the modeling of traffic flows in a more realistic fashion. As part of a larger initiative to develop a detailed subzone modeling capability for the entire Northern Virginia region, the Virginia Department of Transportation (VDOT), in association with Fairfax County, significantly expanded the number of TAZs in Fairfax County from the 356 zones in the regional MWCOG model to 1,438 zones. This expanded TAZ structure was employed in the focused, Fairfax County travel demand model. The MWCOG and the enhanced subzone systems are illustrated in Figures 1.1, 1.2 and 1.3.

In a similar fashion, the level of detail associated with the existing MWCOG regional highway network was significantly enhanced for compatibility with the expanded subzone system in Fairfax County. Specifically, the number of minor arterial facilities and local/collector facilities was increased to create more realistic traffic patterns over the entire highway network. The guiding principle for the inclusion of additional collector and local roads to the subzone system was to add all of those facilities that provide additional points of access to the arterial highway system. Using aerial photographs from the year 2002 provided by Fairfax County, the consultant team created a rendition of the highway network that is more detailed and applicable at the local level than the network associated with the MWCOG regional model. For example, and as shown in Figure 1.4 below, the current physical configuration of all existing interchanges in Fairfax County was replicated as closely as possible in the subzone highway network. A comparison of the MWCOG regional level and Fairfax County subzone level highway network mileage by functional classification is shown in Table 2.1.

Figure 1.1 Fairfax County MWCOG Zone System

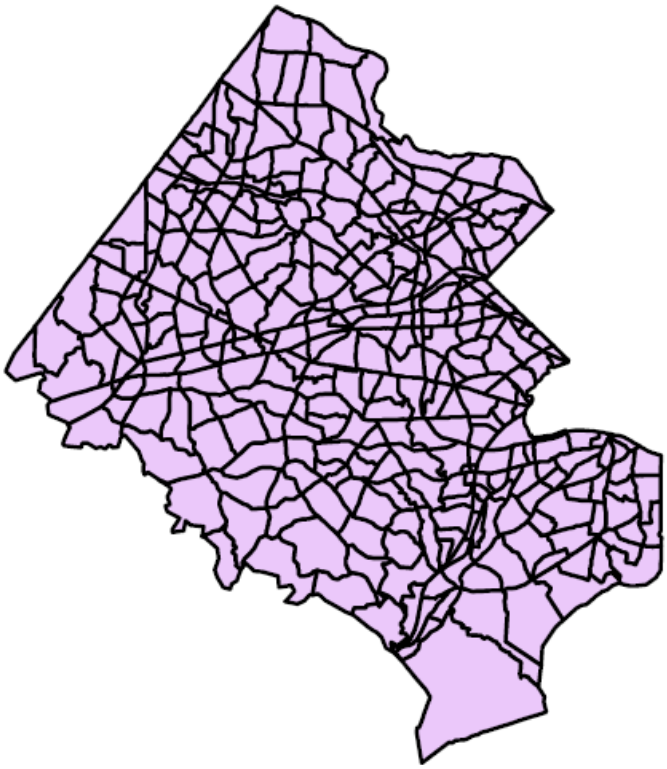


Figure 1.2 Fairfax County Subzone System

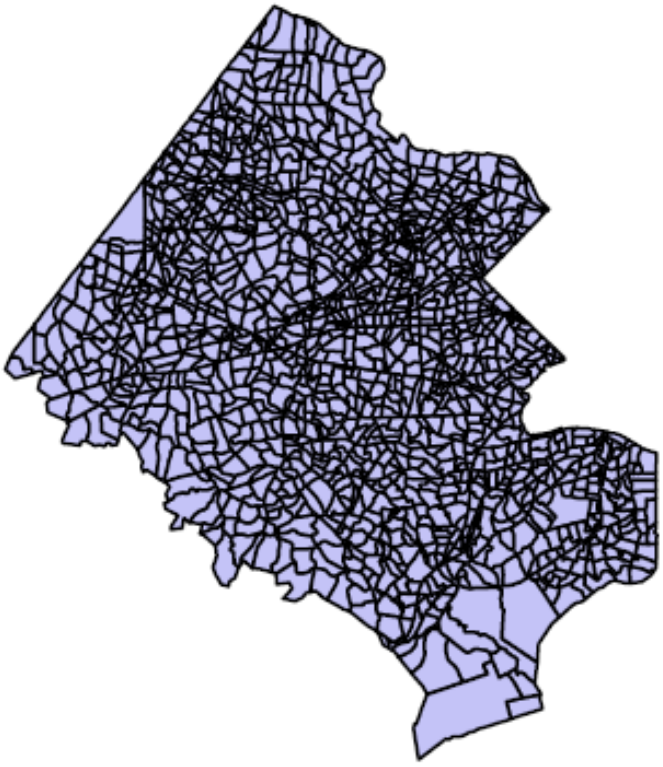


Figure 1.3 Regional Highway Network
MWCOG Regional Model

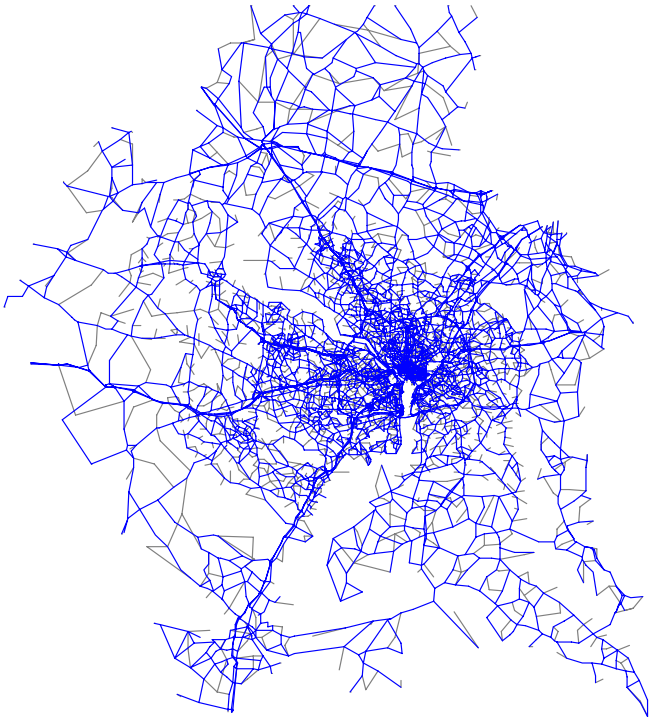
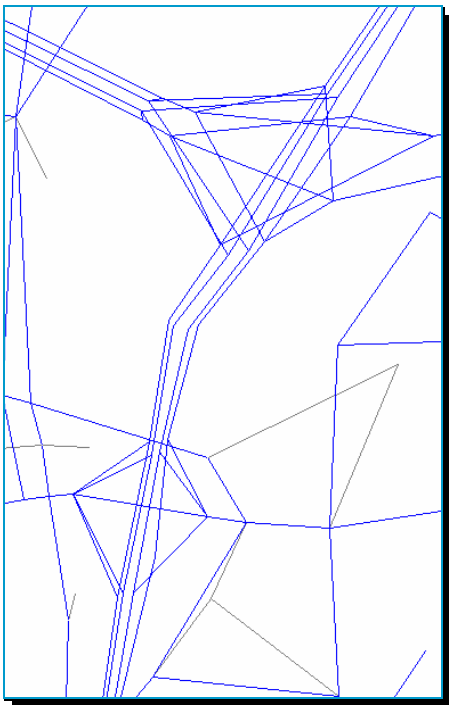


Figure 1.4 Network Detail

MWCOG Model



Fairfax County Subarea Model

Table 1.1 Mileage of MWCOG and Fairfax County Year 2000 Highway Network Models by Functional Classification

	MWCOG		Fairfax County	
	Centerline Miles	Lane Miles	Centerline Miles	Lane Miles
Freeway/Expressway	334	804	353	872
Arterial/Collector/Local	1,426	2,063	1,641	2,340
Total	1,760	2,867	1,994	3,212

The resulting enhanced subzone level highway networks for the base year (2000) and TransPlan horizon year (2030) were used throughout the technical analysis process. A detailed description of the travel demand forecasting process employed as part of the TransPlan update process is provided in a separate technical memorandum – "Fairfax County Subzone Travel Model: Development and Calibration" (January 2006), prepared by Cambridge Systematics, Inc. for the Fairfax County Department of Transportation (FCDOT) – and will not be repeated here.

As previously noted, one of the primary objectives of the TransPlan process is to provide County staff and policy-makers with an up-to-date picture of the performance of the County's transportation system for the present (2000 to 2005) and future years (2030). There are a variety of ways to describe the performance of a particular land use development/transportation network combination in either the base or future year. Forecast traffic volumes are an important source of information needed to assess that performance. The peak-period and total daily traffic assignments were developed into variety of tabular summaries used as measures of effectiveness (MOEs). These MOEs included:

- **Vehicle miles of travel** (VMT), vehicle hours of travel (VHT), and PM peak-period level of service for the county, as well as at the planning district level.
- **Delay.** Overall delay in hours, delay per trip (in minutes), and delay per VMT (in minutes) at the county and planning district levels.
- **Accessibility.** Measures of accessibility such as the number of households and the population within 30- and 45-minute travel times from selected major activity centers (such as Tysons Corner, Fairfax Center, and Springfield).
- **Transit Ridership.** Total average daily transit passengers and transit ridership as a percentage of total average daily home-based work trips at the county level.
- **Screenline Statistics.** Simulated volumes for every highway link crossing any of approximately a dozen different defined screenlines in Fairfax County and a tabular summary of total volumes by screenline. Typical screenlines used include the Capital Beltway (I-495) between the Woodrow Wilson and American Legion Bridges, and I-66 between the Capital Beltway and the Fairfax/Prince William County line.

The use of multiple MOEs allowed for the performance of each land use/ transportation network alternative to be compared against that of all of the other alternatives considered in a consistent manner. This also allowed for the relative

strengths and weaknesses of the various alternatives to be defined at the countywide, planning district and corridor levels in order to facilitate the development of the county transportation plan element recommendations.

As a companion to this analytical process, an important aspect of the TransPlan development included a detailed review and update of the currently adopted transportation policies, objectives, plan maps, and other descriptive plan elements to guide future system development and improvement. This portion of the TransPlan update was undertaken primarily by FCDOT and the Department of Planning and Zoning (FCDPZ), with substantial input from the citizen members of the Transportation Advisory Commission (TAC) and the County Non-Motorized Transportation Committee.

2.0 Land Use Concepts and Transportation Networks

Fairfax County has experienced tremendous growth since 1990, when the transportation plan was last evaluated comprehensively. The County will continue to grow over the next 20 years with the redevelopment and maturation of existing development, and with the development of many of the remaining undeveloped areas in the County. The challenge faced by the County is to develop a set of transportation investments which, over the long term, effectively facilitates economic growth, while maintaining and enhancing all residents' quality of life.

As part of this transportation plan update, the study team evaluated alternative levels of future travel demand and alternative transportation investments. The information provided by these technical assessments helped shape the recommended plan as a framework for guiding future development and transportation decisions.

The technical analysis itself is influenced by a number of important factors. The County has formulated a set of transportation-oriented goals and objectives in the Policy Plan that collectively describe a roadmap for improved travel conditions in the County. These goals and objectives have influenced the types of alternative transportation investments that are being evaluated in this study. The goals and objectives are, in turn, influenced by the transportation issues currently facing the County. Such issues include, but are not limited to, the following:

- The need to facilitate large-scale regional movements of goods and people to activity centers in Fairfax County and across Fairfax County into other jurisdictions;
- The desire to increase travel choices for motorized and non-motorized travel within corridors and centers that have, or will have, a significant mixture of housing and jobs; and
- The need to balance local and through traffic movements so that neighborhoods and communities are not adversely affected by increased levels of traffic.

In simple economic terms, the quality of everyone's travel depends on the demand for, and the supply of, transportation facilities and services. The amount and location of travel demand is largely determined by the levels of household (population) and employment growth that exist today and which are forecast to occur over the 25-year analysis period. The supply of transportation depends upon the set of assumptions regarding the extent and location of transportation facilities and services in the County, and throughout the region. The initial set of assumptions about what the transportation system looks like in the future is derived from the County's current long-range plan, as well as from other sources, including:

- The regional consensus plan for long-range transportation improvements as adopted by MWCOG and its member jurisdictions, known as the Constrained Long-Range Transportation Plan (CLRP)[3]; and
- *TransAction 2030*, the regional transportation plan for the Northern Virginia region developed by the Northern Virginia Transportation Authority.

As the scenarios are evaluated for their effectiveness and adherence to the County transportation plan's goals and objectives, additional scenario tests are generated. This leads to an iterative process of scenario tests which are driven by issues and the updating of scenarios following a process of evaluation. The process of scenario development, testing, and evaluation, which ultimately leads to a set of plan recommendations, is shown in Figure 2.1 below.

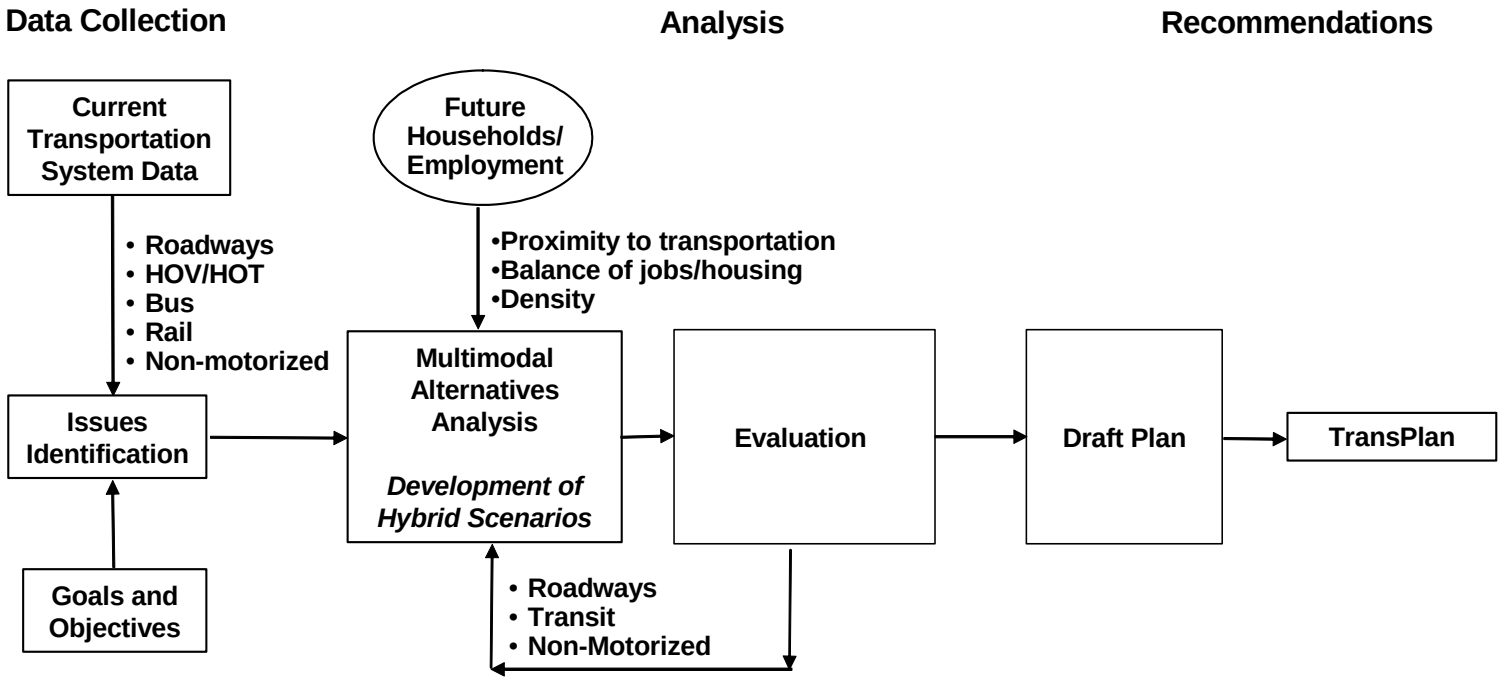
2.1 LAND USE CONCEPTS

The scenario analysis began with an analysis of base year (2000) conditions, followed by a series of analyses that assumed 30 years of additional population and employment growth throughout Fairfax County and the rest of the Washington metropolitan area.

- **Year 2000 model forecasts**. The year 2000 population and employment values were assembled as inputs in the model development process. The results of the year 2000 model forecasts were evaluated against observed year 2000 traffic counts and year 2000 Census data to ensure that the model was: 1) able to achieve a reasonable match to the observed year 2000 data; and 2) was reasonably sensitive to changes in households, jobs, and transportation infrastructure. Once this process was completed, the year 2030 forecasts were initiated.
- **Year 2030 model forecasts**. The year 2030 model forecasts provided data and information for the TransPlan recommendations. All of the land use concepts for the County were provided to Cambridge Systematics' staff by Fairfax County staff based on MWCOG projections or MWCOG studies. These 2030 land use concepts are:

[3] The CLRP describes a set of regional long-range transportation investments which is developed by all member agencies. The development of the CLRP is coordinated by the MWCOG, which uses its own travel demand model for this purpose.

Figure 2.1 Scenario Analysis Process



- **MWCOG Cooperative Land Use Forecasts Round 6.4.** Round 6.4 assumes a moderate level of growth in employment center areas, continued growth at current densities in suburbanizing areas, and relatively high levels of in-commuting in the outer areas of the region.
- **MWCOG Cooperative Land Use Forecasts Round 7.0.** Round 7.0 assumes a concentration of employment growth in centers with good transportation access, and increasing options for travel by transit and HOV. Higher levels of multifamily housing are concentrated in the centers as well. Development in environmentally-sensitive areas is avoided, thus, protecting watersheds and open space. A significant amount of residential growth continues in the suburbanized areas. Compared to the Round 6.4 forecasts, relatively more population and household growth occurs within the core areas of the region, reducing in-commuting from the outer areas of the region.
- **MWCOG Cooperative Land Use Forecasts Round 7.0 with BRAC.** Round 7.0 with BRAC is identical to the Round 7.0 forecast described above, with the exception that it incorporates the recommendations of BRAC[4], and assumes that military employment disperses within the region. In Virginia, one consequence of these recommendations is that total military and civilian DoD employment is anticipated to decrease in Arlington County and increase at Fort Belvoir in Fairfax County, creating a net increase of about 9,000 jobs.
- **Focused Household Scenario.** The Focused Household scenario assumes that a higher level of population and household growth will occur in clusters of concentrated development, with increased opportunities for non-single-occupancy vehicle (SOV) usage, including walking, taking transit, and using HOV lanes to meet travel needs.

The countywide totals for household and employment among the scenarios are shown in Table 2.1 below.

Table 2.1 Household and Employment Assumptions Used in TransPlan Analysis

Year	Scenario Name	Households	Jobs
2000	Base	364,000	573,000
2030	Round 6.4	453,000	860,000
	Focused Households	509,000	860,000
	Round 7.0	500,000	904,000
	Round 7 w/BRAC	500,000	913,000

[4] The Defense Base Realignment and Closure (BRAC) Commission was established by the United States Congress to study and review the Department of Defense's list of proposed military based closures and realignments.

Figures 2.2 and 2.3 below depict the anticipated magnitude and distribution of growth in households and jobs over the period 2000 to 2030 in Fairfax County as a series of dots showing the approximately locations of the projected changes. While the employment growth is more pronounced, the patterns for household and employment growth are quite similar. Most of the growth is concentrated north of the U.S. 50/I-66 corridor and north of that corridor; the major centers of growth occur:

- Along the Capital Beltway in the Tysons Corner, Vienna, and Merrifield areas;
- Along I-66 between U.S. 50 and the Fairfax County Parkway;
- Along Route 28 from the Dulles Toll Road to an area just south of U.S. 50; and
- Along the Dulles Toll Road from Route 28 to an area just west of the Fairfax County Parkway.

South of the I-66/U.S. 50 Corridor, growth is forecast and planned to be less concentrated than in the northern half of the County. Concentrations of growth occur in several locations, including the Laurel Hill area, near the Occoquan River and the Fort Belvoir Area.

Beyond the borders of Fairfax County, the TransPlan analysis assumes the MWCOG Round 7.0 levels of household and employment growth for all jurisdictions for all scenarios. Table 2.2 below presents the year 2030 households and jobs for each of the jurisdictions in the MWCOG region that are included in the TransPlan analysis.

Figure 2.2 2030 Households

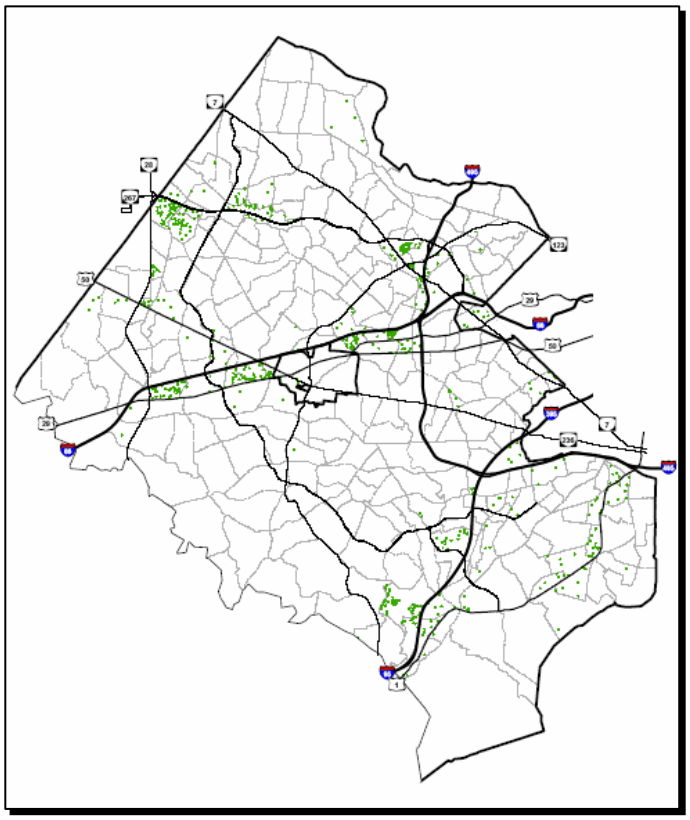


Figure 2.3 2030 Jobs

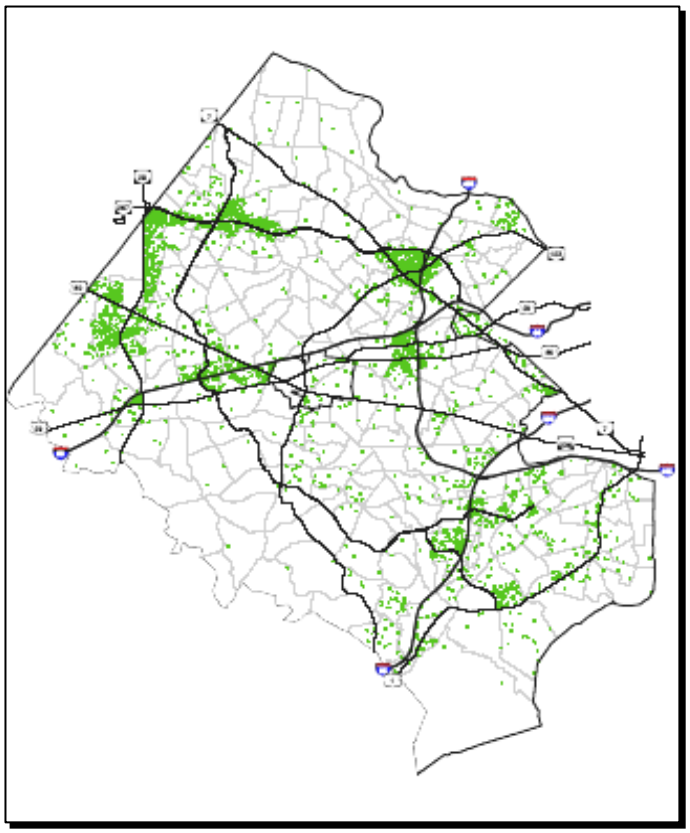


Table 2.2 Regional Population and Job Growth Used in Scenario Analysis

	2000		2015		2030	
Jurisdiction	Households	Employment	Households	Employment	Households	Employment
Alexandria	61,889	91,277	74,557	123,225	86,450	147,957
Arlington	86,901	182,587	105,923	237,784	119,853	275,798
District of Columbia	248,338	743,594	280,697	816,710	317,696	859,991
Fairfax	363,134	585,551	458,860	777,998	500,221	904,191
Loudon	59,900	90,514	134,424	183,801	170,149	271,159
Montgomery	325,329	474,602	390,759	580,329	442,081	670,404
Prince George's	287,828	337,976	333,856	423,636	377,360	544,285
Prince William	109,691	112,108	177,521	169,274	212,864	217,764
Total	1,543,010	2,618,209	1,956,597	3,312,757	2,226,674	3,891,549

To highlight the key areas of forecast growth between 2000 and 2030:

- Fairfax County will experience the largest increment of growth among jurisdictions in the region – 137,000 households and 319,000 jobs. Fairfax County will grow in its position as one of the largest sources of employment in the Washington Metropolitan region.
- Other jurisdictions in Northern Virginia are forecast to grow dramatically as well. Loudoun County is expected to grow in households and jobs by 184 percent and 200 percent, respectively, while the number of households and jobs in Prince William County will each grow by 94 percent.

2.2 TRANSPORTATION ALTERNATIVES

After an initial round of screening, five scenarios were carried forward to the final phase of the technical analysis. These scenarios are:

- **Constrained Long-Range Plan.** The CLRP is an expression of the region's fiscally-constrained transportation funding priorities. Transportation improvements listed in the CLRP have demonstrated their effectiveness in regional transportation analyses, and fall within the projected regional budget for long-term transportation expenditures over a 20- to 30-year time horizon. Key CLRP improvements in Fairfax County/Northern Virginia include: 1) improvements to the existing HOV lanes on I-95 and I-395 inside and outside of the Capital Beltway; 2) the extension of the Metrorail system through Tysons Corner to Dulles International Airport, and on into eastern Loudoun County; and 3) the construction of HOT lanes on the Capital Beltway between the Springfield Interchange and Old Georgetown Pike (Route 193). The CLRP also includes all projects in the approved list of transportation projects which are funded for initiation within the next six years, known as the Transportation Improvement Program (TIP). A list of the most important projects in the CLRP is included in Appendix A to this document.
- **Existing County Plan with Express Bus Service.** The existing county transportation plan focuses on investments to improve internal county travel, and includes proposed improvements to Route 28, U.S. Route 50, the Fairfax County Parkway, and Route 123. The County plan includes all CLRP improvements. To these proposed improvements is added an extensive network of express bus service operating along the arterial highways between all major defined activity centers in the County, and providing transit access to centers of activity in neighboring jurisdictions.
- **Enhanced Transit and HOV (ETHOV).** The enhanced transit and HOV scenario represents a significant expansion in regional transit and HOV investments, and builds towards a network of public transportation facilities to serve both work and non-work travel between major development centers in the County. The ETHOV includes all CLRP improvements, as well as other potential investments such as: 1) an extension of the Metrorail system to Fort Belvoir; 2) a transitway (bus or rail) along Route 28 that provides a transfer point to the Metrorail extension through Tysons Corner to Loudoun County; 3) a transitway which

parallels the Capital Beltway from Springfield to Tysons Corner; 4) a transitway along Columbia Pike from the Pentagon/Pentagon City area to Bailey's Crossroads that would serve medium- to high-density development; 5) an extension of the VRE commuter rail line from to the City of Manassas to the Town of Haymarket/U.S. Route 15 area of western Prince William County; and 6) an express transit service operating on the Fairfax County Parkway and the Franconia-Springfield Parkway during peak periods of travel.

Additionally, two scenarios that extracted the best performing elements of the scenarios listed above were defined and tested as well. These were called the Hybrid Scenarios (#1 and #2). The list of specific projects tested in the two Hybrid Scenarios is shown in Appendix A.

The travel demand implications associated with each of these defined transportation and land use combinations were evaluated in the transportation analysis, with the results summarized in a number of MOEs. The findings of the scenario analysis are the topic of Chapter 3.0.

3.0 Findings of Scenario Analysis

The 2030 transportation analysis that was conducted by Fairfax County and the consultant team analyzed the impacts of large-scale movements of county residents and non-residents as they travel to work; conduct business; or carry out personal chores and travel from, to, and through Fairfax County. The technical analysis confirmed and identified issues with access and mobility that were then addressed with packages of alternative transportation investments and some shifting of land use patterns to coordinate with those investments. Feasibility issues, project prioritization, and funding issues were not addressed as a rigorous part of the study, but were implicitly considered, based on the County staff's knowledge and experience.

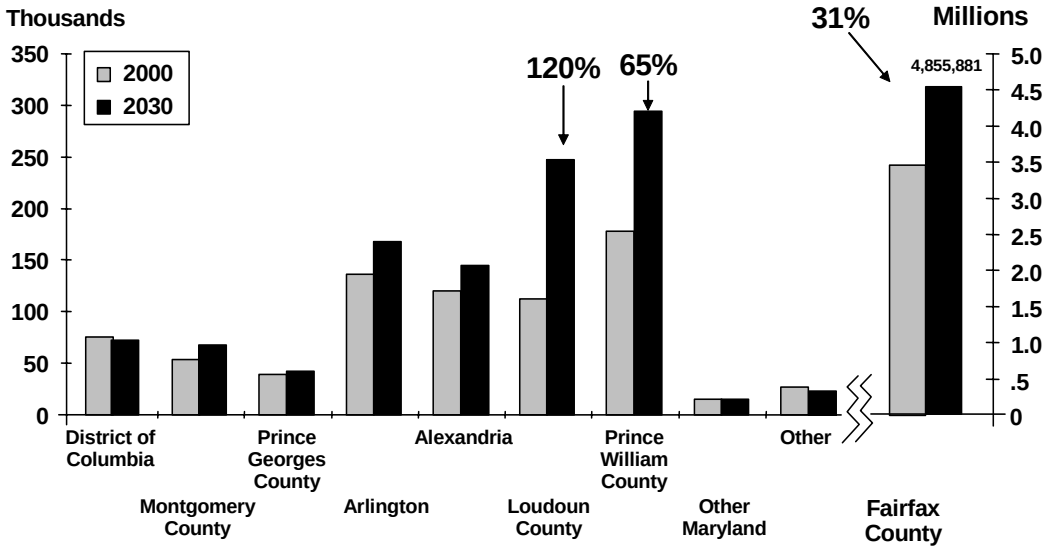
Over the course of the TransPlan update, dozens of alternative land use and transportation network scenarios were tested, evaluated, and reconfigured. In the evaluation process, impacts on all modes of travel and all major transportation facilities have been considered, as have the County's transportation policies, goals, and objectives. The results presented here represent the key findings and recommendations relative to the last set of scenarios tested.

One important purpose of the modeling exercise was to assemble a package of improvements that would create levels of mobility as close to present day (years 2000 to 2005) conditions as possible. A second objective was to create a package of improvements that would be worthwhile of further detailed study at a subsequent point in time. As a countywide study, such detailed analysis was not possible.

The scenario used as the point of comparison is the same scenario used by the MWCOG for its air quality conformity analysis – the *Constrained Long Range Transportation Plan and Round 7.0 with BRAC* scenario. This scenario represents the member agencies' best estimates on what transportation investments can be implemented by 2030, and what the growth in households and jobs will be by that point in time.

As shown in Figure 3.1, total average daily travel to Fairfax County is forecast to grow by about 31 percent relative to the magnitude of year 2000 travel. Most of this growth will occur, according to these forecasts, among jurisdictions in Northern Virginia. The most significant increases in travel to Fairfax County will come from Fairfax County's most rapidly growing neighbors – Loudoun and Prince William Counties. The roadway facilities most directly affected by these trends in growth are I-95, U.S. 50, I-66, the Dulles Toll Road, Route 28, and Route 7. Major new transportation initiatives planned for completion, including the extension of the Metrorail line from West Falls Church to eastern Loudoun County and the addition of HOT lanes on the Capital Beltway will mitigate, but not eliminate, growing levels of congestion. In the evening peak period of weekday travel, travel in moderately congested conditions is forecast to increase by 31 percent, while travel in severely congested conditions is forecast to grow by 53 percent over year 2000 conditions.

Figure 3.1 Estimate of Growth in Trips to Fairfax County
2000 and 2030 County Forecasts



The scenario analysis focused on new travel options for County residents and other travelers. Table 3.1 below presents a summary of the transit and HOV improvements tested in the CLRP, County Plan, ETHOV, and Hybrid Scenarios. Additional detailed information is provided in Appendix A.

One important purpose of the modeling exercise was to assemble a package of projects that would create levels of mobility as close to present day (years 2000 to 2005) conditions as possible. A second objective was to create a package of projects that would be worthwhile of further detailed study at a subsequent point in time. As a countywide study, such detailed analysis was not possible.

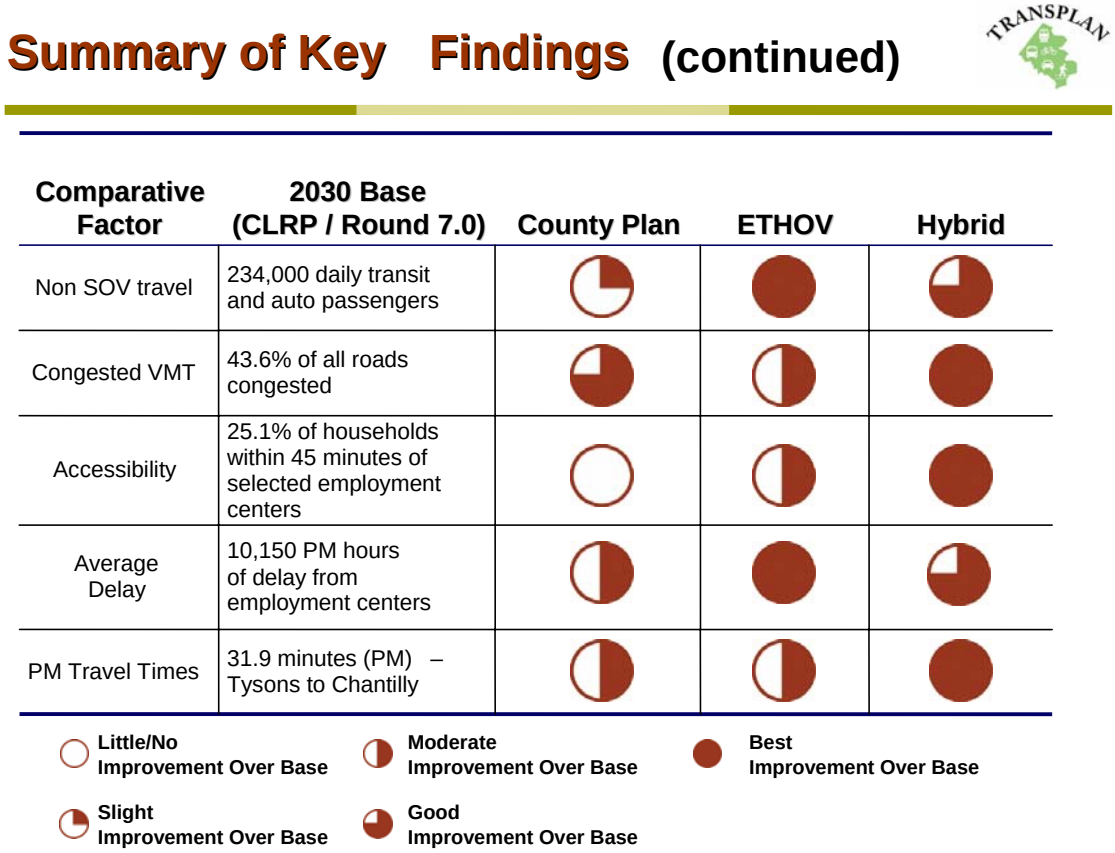
Summary of Results

A graphical depiction of the scenario results is presented in Figure 3.2 below. The relative performance of each scenario compared to those achieved by the 2030 Base scenario (CLRP/Round 7.0) as measured against the measures of effectiveness is denoted by a series of symbols. A completed filled circle indicates that a particular scenario has the "Best" level of improvement for a specific measure, in comparison to the "Base" scenario, while a totally empty circle indicates that a particular scenario has the "Least" degree of improvement for a specific measure, in comparison to the "Base" scenario. Symbols denoting "Slight," "Moderate," and "Good" levels of improvement relative to the "Base" scenario are also defined.

Table 3.1 Transit and HOV Projects by Scenario

Mode	Alignment	From	To	CLRP	County Plan	ETHOV	Hybrid
Metrorail	DTR	Falls Church	Dulles	✓	✓	✓	✓
LRT	Rt. 1	Huntington	Fort Belvoir		✓	✓	✓
LRT	Columbia Pike	Pentagon	Bailey's Crossroads		✓	✓	✓
Metrorail	Orange Line	Vienna	Tri-County Parkway		✓	✓	✓
Metrorail	Green Line	Branch Avenue	Eisenhower	✓	✓	✓	✓
LRT	Beltway	Franconia Springfield	Georgetown Pike			✓	
LRT	Rt. 28	Manassas	DTR			✓	
LRT	Rt. 28	Dulles Toll Road (DTR)	Rt. 7			✓	
Metrorail	Blue Line	Franconia Springfield	Fort Belvoir			✓	
Commuter rail		U.S. 17	PW County Line			✓	✓
HOV	I-495	Franconia Springfield	Georgetown Pike	✓	✓		✓
HOV	I-495	Prince Georges County	Georgetown Pike			✓	
HOV	FFX County Parkway	Springfield Metrorail	Sydenstricker	✓	✓		
HOV	FFX County Parkway	I-66	DTR		✓		
HOV	Braddock Road	I-495	Rolling Road		✓	✓	✓
HOV	I-95/I-395	Franconia Springfield	Prince William County		✓	✓	✓
HOV	FFX County Parkway	Rt. 7	Springfield Metrorail			✓	✓
HOV	I-66	I-495	Tri-County Parkway			✓	✓
HOV	Dulles Toll Road	I-66	Airport			✓	
HOV	Rt. 28	Rt. 7	Rt. 234				✓
HOV	Vienna South Metrorail Ramp	I-66	Vienna South Metrorail				✓

Figure 3.2 Summary of Scenario Comparisons



In terms of the measures evaluated, and relative to the current County transportation plan, the Hybrid Scenario:

- Reduces reliance on single-occupant auto use;
- Generates more transit ridership;
- Improves mobility and accessibility for County residents; and
- Maintains congestion levels closer to present day (years 2000 to 2005) conditions than any of the other scenarios tested.

In addition, the Hybrid Scenario more explicitly responds to the Policy Plan's revised transportation objectives and policies, most explicitly in the areas of:

- Support for multimodalism;
- Encouragement of Transportation Demand Management (TDM); and
- Improved integration of land use and transportation investments.

These scenario tests have led to a set of proposed transportation improvements that are proposed for inclusion in the TransPlan update. These recommended improvements are discussed in the next chapter of this report.

4.0 Recommended Changes to the Current County Transportation Plan

Based upon the findings and results of the Scenario Analysis described in Chapter 3.0, a number of refinements to the currently adopted Fairfax County Transportation Plan are recommended. These are primarily transit and highway system improvements and collectively constitute the "Hybrid 2030 Transportation Plan" for Fairfax County. The term "hybrid" is used to reflect the many sources that have informed the plan's recommendations. These sources include the County's current transportation plan, as well as the MWCOG Constrained Long-Range Plan, the TransAction 2030 Study, and the County's evaluation and assessment of emerging transportation needs undertaken as part of this update.

A key finding of the Scenario Analysis was the determination that the justifications and needs for the vast majority of the current transportation plan's recommendations are still valid. Thus, most of the major public transit and highway elements of the currently adopted plan have been retained as elements of the "Hybrid Plan."

The recommendations of the "Hybrid Plan" primarily describe additional investments beyond those included in the currently adopted transportation plan. However, there are some notable modifications to a few of the current recommendations as well. Each of the major changes to the currently adopted county transportation plan is briefly described below.

Transit System Recommendations

Fourth Metrorail Station in Tysons Corner Area

The current county transportation plan envisioned a total of only three Metrorail stations in the Tysons Corner area as part of the proposed Metrorail extension to Dulles Airport and beyond into eastern Loudoun County. The recently completed Final Environmental Impact Statement (FEIS) for the Dulles Corridor Transit Project recommended the construction of four Metrorail stations in the Tysons Corner area. These stations are identified as Tysons East, Tysons Central/Route 123, Tysons Central/Route 7, and Tysons West, respectively. Thus, for consistency with the recommendations of the FEIS and the ongoing engineering studies for the Metrorail extension, this plan update includes the identification of the general location of these four transit stations.

Metrorail Orange Line Extension to Centreville Area

The current county transportation plan, as originally adopted in 1991, identified the I-66 corridor from the Capital Beltway (I-495) west to the Centreville area as an "Enhanced Public Transportation Corridor" with generalized locations identified for several potential stations. In 1999, the Virginia Department of Rail and Public Transportation (DRPT) completed a multimodal Major Investment Study (MIS) for this corridor. Subsequently, the VDOT and DRPT have jointly sponsored a follow-up Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) which has yet to be completed. Based on the findings to date from these two independent studies and the results of the Scenario Analysis, this plan update includes a recommendation for the extension of the Metrorail Orange line from its current terminus at the Vienna/Fairfax-GMU Station west to the Centreville area. The exact number and location of the stations on this proposed extension will not be known until the completion of the AA/DEIS process.

Columbia Pike LRT/BRT to Baileys Crossroads/Skyline

Beginning with the 1999 WMATA *Transit Service Expansion Plan*, the Columbia Pike corridor in Fairfax and Arlington Counties has been identified as a potential area for the provision of fixed guideway transit services. Subsequent studies, most recently the *Columbia Pike Transit Alternatives Analysis* (July 2005), have further assessed the potential for the implementation of fixed guideway transit service in this corridor, specifically between the Pentagon/Pentagon City area and Bailey's Crossroads. The *Columbia Pike Transit Alternatives Analysis*, also referred to as the "Pike Transit Initiatives" study, recommended that the Modified Streetcar Alternative be carried forward as the Preferred Alternative into the next phase of the project development process (preliminary engineering and environmental review)[5]. The proposed modification to the currently adopted Fairfax County Transportation Plan adds this recommendation as an "Enhanced Public Transportation Corridor" from Bailey's Crossroads to Tysons Corner along Route 7.

Improved Transit Service to Fort Belvoir

During the summer and fall months of 2005, the Federal BRAC issued a series of recommendations for changes to the size, mission, and location of various military and civilian units and facilities of the DoD in both the United States and overseas. A number of these changes directly affected several DoD facilities in the Washington Metropolitan Area. While some facilities were designated for reduction in level of activity or complete closure, Fort Belvoir was identified as the location for a major increase in employment on the order of an additional 20,000 military and civilian employees. Preliminary assessments of the transportation system impacts of such a major change in employment conducted as part of the TransPlan process identified

[5] The Modified Street Car Alternative proposes street car service that would be supplemented by express bus service. Both services would operate in a separate travel lane along Columbia Pike.

the potential need for significant expansions of existing transit services to and from Fort Belvoir. Potential transit service improvements identified as part of the TransPlan process included the following:

- Implementation of a bus rapid transit and light-rail transit (BRT/LRT) type service from the Huntington Metrorail Station to Fort Belvoir along the U.S. Route 1 corridor; and
- Extension of the Metrorail Blue Line service from the Franconia/Springfield Transportation Center to Fort Belvoir along the I-95 corridor.

With an understanding that any such major fixed guideway transit service investments would be subject to completion of the Federal Transit Administration's (FTA) New Starts process, these two corridors have both been identified in this plan update as an "Enhanced Public Transportation Corridor."

Express Bus/BRT Improvements in Selected Corridors

Based on the findings of the scenario analysis, a number of additional corridors in Fairfax County beyond those so designated on the current transportation plan have been identified as potential "enhanced public transportation corridors." Although the specific type of enhanced public transportation service cannot be defined at this time based upon the level of analysis conducted to date, the corridors which appear most appropriate for this designation are:

- U.S. Route 50 from the Fairfax/Loudoun County line east to the City of Fairfax and continuing to the east to the City of Falls Church; and
- VA Route 236 from U.S. Route 50 to the I-395 interchange near the Fairfax County/City of Alexandria line.

Highway System Recommendations

HOT/HOV Lanes on the Capital Beltway

In 1995, VDOT initiated a MIS to assess the feasibility and optimal configuration of transportation improvements to the Virginia portion of the Capital Beltway. The MIS concluded that additional travel lanes would be the most effective transportation investment in the Beltway Corridor. Two types of highway improvements were recommended for future study, adding HOV lanes and converting the Beltway to an express/local roadway configuration. In 1998, VDOT initiated location and environmental studies for the recommended Beltway improvements. A Draft EIS, which evaluated rail transit, HOV, and other modal options on the Capital Beltway, was completed in March 2002. Based on the large number of comments received from local governments and the general public, VDOT subsequently decided to also evaluate the feasibility and effectiveness of HOT

lanes on the Beltway[6]. Under the proposed HOT concept, HOV drivers would be allowed to use the lanes at no charge, while single- or low-occupant drivers could use the lanes for a fee. The fee is typically variable, and will be set to maintain a constant level of traffic flow.

Plans to add HOT lanes to the Beltway in Northern Virginia are moving forward. On January 20, 2005, the Commonwealth Transportation Board (CTB) passed a resolution approving the 12-lane HOT concept as the preferred alternative for the Capital Beltway corridor. This decision was documented in the project's FEIS issued in the spring of 2005.[7] The Fluor Daniel Corporation, under terms set by the Commonwealth's Public Private Transportation Act (PPTA), will undertake the detailed planning, design, construction, and operation of four HOT lanes, two lanes in each direction, along the Capital Beltway corridor between the Springfield Interchange (I-95I-395/I-495) and the vicinity of the American Legion Bridge. This action, which has been approved by the Commonwealth Transportation Board, is proposed for incorporation in this transportation plan update.

HOV on the Fairfax County Parkway/Franconia-Springfield Parkway from Route 7 to Springfield

The currently adopted Fairfax County Transportation Plan recommends the provision of HOV lanes on the Fairfax County Parkway between the Parkway/I-66 interchange and the Parkway/Dulles Toll Road (VA Route 267) interchange. Based on the findings of the scenario analysis, it is recommended that the limits of the HOV operation along the Parkway be extended north of the Dulles Toll Road to the VA Route 7 interchange and extended south of I-66 to the Springfield/Franconia Parkway interchange, and then along both the Fairfax County Parkway and the Springfield/Franconia Parkway facilities to their terminus points. The current plan recommends a four-lane cross-section north of Baron Cameron Avenue. This plan update recommends an increase to six lanes from Baron Cameron Avenue to Route 7, to accommodate the HOV lanes. The HOV operation would use the planned third lane in each direction along the Parkway mainline, with HOV operations provided in both directions during the AM and PM peak periods in a manner similar to the peak period HOV operations along the DTR corridor.

HOV on Route 28 from County Line to Route 7

The currently adopted County Transportation Plan designates Route 28 as an enhanced public transportation corridor from the Fairfax/Loudoun County line on the north to the Fairfax/Prince William County line on the south. Based on the findings of the scenario analysis, this plan update recommends that two-way, peak-period HOV operations be provided along Route 28 from the County line to the Route 28/Route 7 interchange in Loudoun County. The HOV operation would use

[6] http://www/virginiadot.org/projects/studynova-capbeltway.asp, web site accessed January 29, 2006.

[7] http://project1.parsons.com/capitalbeltway/, web site accessed January 29, 2006.

the planned fourth lane in each direction along Route 28, with HOV operations provided in both directions during the AM and PM peak periods in a manner similar to the peak period HOV operations along the DTR corridor.

New Interchange on Fairfax County Parkway at Shirley Gate/Pope's Head Road

The currently adopted County Transportation Plan recommends the extension of Shirley Gate Road (Route 655) from its current southern terminus at Braddock Road (Route 620) to the Fairfax County Parkway north of Popes Head Road (Route 654). Based on the findings of the scenario analysis, it appears that the existing at-grade junction between Popes Head Road and the Fairfax County Parkway, even with substantial improvements, will not be able to accommodate projected year 2030 travel demands. It is recommended that the plan update include a grade separated intersection at the Popes Head Road/Shirley Gate/Fairfax County Parkway junction. The exact details associated with the configuration of this proposed interchange would be defined through detailed engineering and environmental studies.

Substitute Overpass for Full Interchange at Little River Turnpike in Annandale Commercial Business Center

"A grade-separated interchange at the intersections of Little River Turnpike (VA Route 236) with Annandale Road (Route 650), Ravensworth Road (Route 649), and Backlick Road (Route 617) has been shown on the Fairfax County Comprehensive Plan since the 1970s. This proposed interchange would connect these arterial roadways to allow for the smooth and uninterrupted flow of traffic between these facilities."[8] Recognizing the potential physical impact of a grade-separated interchange on this revitalization area, the Comprehensive Plan recommended that a one-way paired street system be studied as an alternative. In 2005 the Annandale Community Business Center Circulation Study was completed and recommended that the provision of such a full grade-separated interchange be removed from the Comprehensive Plan provided that a feasible option is retained in the Comprehensive Plan.[9] The plan update recommends that an overpass be constructed to carry north-south traffic in the Annandale Road/Backlick Road corridor over Little River Turnpike, with the connections to and from this grade-separated overpass link to be provided by improved local circulation street linkages to the northern and southern ends of the overpass structure. It is also recommended that Little River Turnpike continue to be shown on the Plan as a six-lane facility.

Laurel Hill Roads

Based on the results of a County study of transportation needs in the Laurel Hill area, a number of refinements to the current transportation recommendations for the

---

[8] Fairfax County Comprehensive Plan, 2003 Edition; Annandale Planning District, Amended through December 6, 2004, Annandale Community Business Center, pp. 29-31.

[9] Annandale Community Business Center Circulation Study, VHB, 2005, p. 44.

area are recommended. These include revising the recommendation for Lorton Road through the area from six lanes to four, Furnace Road south of Lorton Road from four lanes to two, and Silverbrook Road between Route 123 (Ox Road) and Hooes Road from two lanes to four. Several adjustments to planed collector roadways on the Laurel Hill property are also recommended.

A. Highway and Transit Projects Tested in Analysis

Table A.1 CLRP Projects Included in all Scenarios

Improvement	Road
Interchange	I-66/I-495
Interchange	I-66/US 29
Widen	I-95
Interchange	I-95/VA 642
Interchange	I-95/VA 7900
Interchange	I-95/VA 613
Interchange	I-95/I-395/I-495
Widen	US 1
Widen	US 29
Widen	US 50
Widen	VA 7
Widen	VA 28
Construct	VA 411/Tri-County Parkway
Widen	VA 123
Widen	VA 236
Intersection	VA236/Braddock Road
Widen	VA 7100
Interchange	VA 7100/Fair Lakes Parkway
Widen	DAR
Interchange	DAR/I-495
HOV	I-495
Metro	Dulles Corridor

Table A.2 TIP Projects Included in All Scenarios

Improvement	Road	From	To
Widen	VA 608	VA 6558	VA 6985
Widen	Telegraph Road	Beulah St	S. Kings Hwy
Interchange	Van Dorn Street/Franconia Road		
Widen	Rolling Road	Fairfax County Parkway	Old Keene Mill Road
Widen	Lorton Road	Silverbrook Road	US 1
Widen	Burke Lake Road	Lee Chapel Road	Fairfax County Parkway
Widen	Stringfellow Road	Fair Lake Blvd.	US 50
Widen	Centreville Road	West Ox Road	Frying Pan Road
Widen	Spring Hill Road	VA 7	International Drive
Widen	VA 7100	US 50	Sunrise Valley Drive
Widen	VA 7100	Fullerton Road	VA 7900

Table A.3 Projects Included in Hybrid Scenario 2

Mode	Description	Facility	Area
HOV	HOV/HOT Lanes 4-2-2-4 All Day	I-495	Franconia-Springfield to Georgetown Pike
Transit	Light Rail Transit	Columbia Pike	Pentagon to Bailey's Crossroads
Transit	VRE	From US 17	Prince William County Line
Transit	Metro	Green Line	Branch Avenue to Eisenhower
Transit	Metro	Orange Line	Vienna to Ashburn
Transit	Light Rail Transit	US Route 1	Huntington to Fort Belvoir
Transit	Metro	Blue Line	Franconia-Springfield to US Route 1/Fort Belvoir
HOV	Reversible HOV 4-2-0-4	I-66	I-495 to Tri-County Parkway
Transit	Express Bus	Fairfax County Parkway	Franconia Springfield to Herndon-Monroe Park and Ride
Highway	Add auxiliary collector/distributor lane	I-495	North of Dulles Toll Road
Highway	Increase Capacity - change from collector to minor arterial	Lawyers Road	East of Hunter Mill Road to VA 123
HOV	Dual HOV lanes 4-1-1-4	VA 28	VA 7 to Route 234
HOV	Dual HOV lanes 3-1-1-3	Braddock Road	I-495 to Rolling Road
Highway	Remove Interchange	Annandale CBD	Annandale Road/Backlick Road
Highway	Add Bridge to Grade Separate	Annandale Road	Backlick Road

Table A.3 Projects Included in Hybrid Scenario 2 (continued)

Mode	Description	Facility	Area
Highway	Add Ramp to Tyson's Corner	Beltway HOT/HOV lanes	One lane per direction at West Park and West Gate
HOV	HOV 2-1-1-2 during peaks, 3-0-0-3 off peak	Fairfax County Parkway	Route 7 to Springfield Metro
Highway	Ramp Capacity Increase	I-495	I-66
HOV	Add 1-lane HOV Ramp	I-66 West	to Vienna South Metro Station
Highway	Connect Road over Dulles Toll Road	Connect Soapstone Road to Isaac Newton Square West	Near Wiehle station/Dulles Airport Access Road crossing
Highway	Add 2-2 divided Roadway	Old Mill Road Bypass	North of Ft. Belvoir
Highway	Remove Underpass	Town center parkway	Under Dulles Toll Road
Highway	Widen Hunter Mill Road to 2-2	Hunter Mill Road	Vale Road to Dulles Toll Road/Sunset Hills Road
Highway	Add Road	McLaren/Lawyers Road Extension	West Ox Road to Reston Parkway
Highway	Add Road	Shirley Gate Road	Braddock Road to Fairfax County Parkway
Highway	Add Road	Wiehle Avenue Extension	Drainsville Road and Sterling Boulevard
Transit	Bus Service	Enhanced Bus Service	Between Lorton VRE station and Engineering Proving Grounds (EPG)

Table A.3 Projects Included in Hybrid Scenario 2 (continued)

Mode	Description	Facility	Area
Highway	Add Interchange	Shirley Gate Road and Fairfax County Parkway	Ramp from SB Shirley Gate to SB Parkway connecting south of Popes Head Road. NB Ramp from NB Parkway to NW Shirley Gate Road. Exit from EB Popes Head Road connecting to Shirley Gate at a stop light North of Popes Head Road.
Transit	Bus	Enhanced Bus Service	Newington Metro to Fort Belvoir